**Assignment weeks 3, 4 and 5**

# *To answer all the questions below, you must use Stata (and, specifically, DASP, if requested). Be concise and clear in your answers.*

# *The assignment is divided into three exercises (the points assigned to each exercise are indicated next to each exercise). Please answer (A) directly in this file after each question (Q) and please attach the \*.do file (do-file) that you generated. Rename both files as: “Assignment weeks 3-4-5 - Name, Surname”. Please submit this completed file and the \*.do through the virtual drop box (boîte de dépôt) in the course portal, no later than Tuesday, February 23 11:59 p.m. (*[*Québec time*](https://www.timeanddate.com/worldclock/converter.html?iso=20190227T045900&p1=189)*).*

***Please, organize your dofile by exercise. Feel free to make your comments/discussions in the do-file.***

# Exercise 1 (4%)

Assume that the population is composed of six individuals belonging to two population groups, 1 and 2. The following table shows the distribution of incomes for three different periods.

|  |  |  |  |
| --- | --- | --- | --- |
| *group* | *inc1* | *inc2* | *inc3* |
| 1 | 1 | 8 | 2 |
| 1 | 2 | 8 | 4 |
| 1 | 9 | 8 | 18 |
| 2 | 3 | 24 | 2 |
| 2 | 6 | 24 | 4 |
| 2 | 27 | 24 | 18 |

* 1. For the distribution *inc1*, state whether the following affirmations are true or false, and then why.

1. Based on the *Scale invariance principle* the income inequality of group1 is equal to that of group 2. Input the data and confirm your justifications by estimating the Gini index by population group.

**A: TRUE**

**The inequality index has not changed after all incomes are scaled by a common factor (of 3). Income inequality of group 1 is equal to that of group 2.**

**Gini Index Estimate = 0.444444**

**igini inc1, hgroup(gr)**

**Index : Gini index**

**Group variable : group**

**-------------------------------------------------------------------------------------------**

**Group | Estimate STE LB UB**

**--------------------------+----------------------------------------------------------------**

**1: 1 | 0.444444 0.100411 0.186331 0.702558**

**2: 2 | 0.444444 0.100411 0.186331 0.702558**

**--------------------------+----------------------------------------------------------------**

**Population | 0.534722 0.080462 0.327888 0.741557**

**-------------------------------------------------------------------------------------------**

1. **B**y considering the *Scale invariance principle* and the *Population principle,* the income inequality of group1 is equal to that of the total population.

**FALSE;****the income inequality of group1 is NOT equal to that of the total population. The population principle that states that the inequality should remain the same to replication of the population and in our case.**

**Group 1 inequality = 0.444444**

**Population inequality = 0.5347222**

**A:**

1. The between group inequality of *inc1* is equal to that of *inc2.* Also, check this by using the ***dentropyg*** DASP command (for instance, for theta=0).

**A: TRUE;**

**The ratio between the average income of the two groups in the periods 1 was 4/12=1/3. The ratio of average income of the two groups in period 2 was 2/6=1/3 that shows that the between group inequality are the same.**

**Between group inequality for Inc 1 = Inc 2 = 0.143841**

1.2 Using the DASP command ***dentropyg***, decompose the entropy index (the parameter theta = 0). Do this for each of the three periods.

**A: Period 1**

**At population level, the entropy index is equal to 0.566678 with a standard**

**error of 0.215967.**

**For group1, as well as group2, the entropy index is equal to 0.422837 with a standard error of 0.114650.**

**Population share: The components in between-group inequality contribute 25 % to the total population and within-group inequality contribute 75% to the total inequality.**

**Period 2**

**At population level, the entropy index is equal to 0.143841 with a standard**

**error of 0.022050.**

**For group1, as well as group2, the entropy index is equal to -0.000000 with a standard error of 0.000000.**

**Population share: There is no within inequality, between inequality components contribute 100% to the total inequality.**

**Period 3**

**At population level, the entropy index is equal to 0.422837 with a standard**

**error of 0.081070.**

**For group1, as well as group2, the entropy index is equal to 0.422837 with a standard error of 0.114650.**

**Population share: There is no between inequality, within inequality components contribute 100% to the total inequality.**

1.3 Estimate the Gini inequality of each of the three distributions with the ***igini*** DASP command and discuss the results.

**A: GINI for distribution 1 = 0.534722**

**GINI for distribution 2 = 0.250000**

**GINI for distribution 3 = 0.4444**

**There are disparities/inequalities across the three distributions.**

**Index : Gini index**

**-------------------------------------------------------------------------------------------**

**Variable | Estimate STE LB UB**

**--------------------------+----------------------------------------------------------------**

**1: GINI\_inc1 | 0.534722 0.080462 0.327888 0.741557**

**2: GINI\_inc2 | 0.250000 0.055902 0.106300 0.393700**

**3: GINI\_inc3 | 0.444444 0.071001 0.261930 0.626958**

**-------------------------------------------------------------------------------------------**

# Exercise 2 (5.5%)

Assume that the population is composed of eight households.

|  |  |  |  |
| --- | --- | --- | --- |
| *identifier* | *pre\_tax\_income* | *hhsize* | *nchild* |
| 1 | 240 | 4 | 2 |
| 2 | 600 | 5 | 3 |
| 3 | 230 | 3 | 2 |
| 4 | 1250 | 3 | 1 |
| 5 | 1900 | 4 | 1 |
| 6 | 280 | 4 | 2 |
| 7 | 620 | 3 | 1 |
| 8 | 880 | 4 | 3 |
| **Total** | **6000** | **30** | **15** |

The disposable income of the household is composed of the following three income sources:

1. The post tax income = pre-tax income – income tax;
2. The received child allowances
3. Universal income

The government perceives two potential scenarios (A and B).

* Scenario A: applying a proportional income tax of 10%. 60% of the total collected taxes are equally distributed across the population as a guaranteed universal income. The rest of the budget is equally redistributed across the population of children, as allowances.
* Scenario B: applying a proportional income tax of 10%, and then equally redistributing the generated revenues across the population of children. In that case, the guaranteed universal income is equal to zero.

2.1 Using Stata, input the data (the eight observations), and then generate the variables:

* *pcincatA:* per capita post tax income with the scenario A;
* *pcincatB:* per capita post tax income with the scenario B;
* *pcuincA:* per capita universal income with the scenario A;
* *pcuincB:*  per capita universal income s with the scenario B;
* *pcallowA:* per capita child allowances with the scenario A;
* *pcallowB:*  per capita child allowances with the scenario B;
* *dpcincA:* per capita disposable income with the scenario A (*pcincatA+ pcuincA+ pcallowA*);
* *dpcincB:* per capita disposable income with the scenario B (*pcincatB+ pcuincB + pcallowB*).

**A:**

2.2 Using the DASP command *igini*, estimate the inequality in the distribution of the per capita disposable income for each of the two scenarios.

**A: Scenario A = 0.228505**

**Scenario B = 0.25094**

**The results show that scenarion A has the highest reduction in inequality in disposable income as the gini estimate is 0.228505 compared to 0.25094 in scenario B. This implies that giving allowance to children and** equally distributing income (tax revenue) across the population as a guaranteed universal income **is a much better policy to help reduce inequality than sharing the tax income as allowances for children only**

2.3 Using the DASP command *diginis*, decompose the inequality in the distribution of the per capita disposable income for each of the two scenarios (remember that the three income sources are *pcincatA, pcuincA and pcallowA* for the scenario A and *pcincatB, pcuincB and pcallowB* the scenario B)*.*

**A: For scenarion A,**

**The total Gini inequality is equal to 0.228505**

**For the first component (per capita post tax income ), we have that:**

**- Its income share (mu\_k/mu) = 0.585429**

**- Its concentration index (C\_k) = 0.395556**

**- Based on the Rao's (1969) approach, its absolute contribution to total Gini inequality is (mu\_k/mu) \* C\_k = 0.231570**

**scenario B,**

**The component of universal income source is 0 throughout as we have noticed from the initial definition of the scenario that no income is distributed universally to the population.**

**We can also conclude that child allowances help in reducing inequality in disposable**

**Incomes as evidenced by their marginal values of absolute and relative contribution to inequality.**

2.4 Based on the results of 2.2 and those of 2.3, in which case will the set of transfer programs reduce inequality in disposable incomes the most? Why?

**A: Scenario A is the one with the highest reduction in inequality in disposable incomes**

**based on its smaller GINI index (0.228505) compared to scenario B (0.25094).**

**This is because this program effectively targets the deprived or poor households.**

**and makes the contribution of the source Child Allowances more effective in reducing inequality.**

2.5 Estimate the change in the headcount related to the program B (with respect to the initial distribution) when the poverty line is 100 (use the DASP command *difgt*).

**A:**



Without child allowances, the poverty head count is: 0.3666667

With child allowances, the poverty headcount is: 0

Child allowances reduce the poverty head count by 0.3666667 (36.7%)

This difference is significant by about 10% (i.e. P>|t| = 0.1)

2.6 Estimate the change in the poverty gap related to the program B (with respect to the initial distribution) when the poverty line is 100 (use the DASP command *difgt*). Discuss the found results in 2.5 and 2.6.

**A: **

Without child allowances, the poverty gap is : 0.1166667

With child allowances, the poverty gap is : 0

This difference is significant by about 10% (i.e. P>|t| = 0.1)

Child allowances reduce the poverty gap from .1166667 to 0 or by 0.1166667. The results are showing that both poverty measures agree that the distribution moves to non-poor with enacting of allowance to children.

# Exercise 3 (3%)

* 1. Load the file data\_1, then initialize the sampling design with the variables *strata, psu* and *sweight*.

**A: svyset psu [pweight=sweight], strata(strata)**

**pweight: sweight**

**VCE: linearized**

**Single unit: missing**

**Strata 1: strata**

**SU 1: psu**

**FPC 1: <zero>**

* 1. Using the DASP ***ifgt*** command, estimate the headcount when the measurement of well-being is the adult equivalent expenditures, and when the poverty line is equal to 21 000.

**A: Estimate of adult equivalent expenditure = 0.332727**

* 1. Now, estimate headcount poverty by population groups (defined by the sex of the household head) and discuss the results.

**A: Total population poverty head count is 33.27 percent. This means 33.27 percent of the total population is poor, disaggregated by 32.15 percent of males and 37.16 percent of females being the poor proportion of the poor population.**

**33.27 percent of the total population is living below the poverty line of 21000**

**32.15 percent of males are living below the poverty line of 21000**

**37.16 percent of females are living below the poverty line of 21000**

**Females are more poor than males**